



July 8, 2009

Mr. Michael B. T. Wilkes
Wilkes Bowers, P.A.
127 Dunbar Street, Suite 200
Spartanburg, SC 29306

Re: Lycoming IO-540-K1J5, SN RL-19263-48A, installed on Glasair III, N342MJ

Dear Mr. Wilkes:

Per your request, I have reviewed the information contained in the documents listed in Attachment "A" to this report related to the above-referenced matter. I have included my current curriculum vitae. I have expertise in aircraft engine maintenance and related mechanic operations including disassembly, inspection, and reassembly of aircraft engines. I also have experience in maintaining aircraft with experimental certification. I have conducted an inspection of certain incident engine components. I am familiar with the Lycoming IO-540 series engine, including the maintenance, inspection, and overhaul procedures. I am also familiar with key aspect of the Glasair aircraft design requirements. In addition, I have discussed with Mr. Donald R. Bennett the procedures he followed during his disassembly, inspection, and reassembly of the engine after a propeller strike had occurred.

According to available information, an experimental-certificated Glasair III, N342MJ, experienced a propeller strike after a landing gear failure in October 2007. The aircraft owner subsequently requested that the experimental engine be torn down and inspected. Mr. Donald Bennett performed the requested disassembly and sent the major engine components to Engine Components Inc. (ECi) for inspection. The components were returned as being overhauled (yellow tagged) with the exception of the crankshaft and crankshaft gear which were inspected but not yellow tagged due to their having had previous modifications that did not comply with the original engine manufacturer's specifications. Upon receipt of the ECi-inspected components, Mr. Bennett reassembled the engine using various new parts which were documented. It was noted that the engine had previously been modified with components from Ly-con Aircraft Engines to significantly increase the engine's horsepower.

Mr. Bennett informed me that it was his shop practice to have any maintenance/repair work checked by another shop technician prior to the aircraft, engine, or component being returned to service. This procedure was followed during the reassembly of the incident engine and specifically during the installation of the crankshaft gear assembly.

It is my opinion that Mr. Bennett was a properly FAA certificated, experienced and current maintenance technician and was fully qualified and capable of conducting the aforementioned engine disassembly, inspection, and reassembly. It is also my opinion that Mr. Bennett disassembled, inspected, and reassembled the incident engine in a manner consistent with proper maintenance practices associated with his certification and that he properly used the only available standards as provided in the Lycoming overhaul manual, applicable airworthiness directives, and service bulletins. Additionally, it is my opinion that the incident Lycoming engine did not meet the FAA-approved type design due to the previous extensive modifications to the engine. Finally, it is my opinion that an extensively modified engine operated beyond its original certificated power rating, and in the absence of any documented data regarding its operations and limitations, can not be ascertained as to its safety of flight capability.

With respect to Mr. Bennett's qualifications, he has held a Federal Aviation Administration (FAA) Mechanic certificate with Airframe and Powerplant ratings for more than 40 years. He has also held (and still holds) an Inspection Authorization (IA) from the FAA for more than ten years for which he has been recertified each year.

It is important to identify regulatory requirements pertaining to an engine relative to the owner/operator, mechanic, and engine manufacturer. FAR 91.403 *General* spells out that an aircraft owner/operator (Mr. Sedberry) is primarily responsible for maintaining his aircraft in an airworthy condition.

FAR Part 43 *Maintenance, Preventive Maintenance, Rebuilding, and Alteration* spells out the mechanic's responsibilities when performing maintenance, alteration, or preventive maintenance on an aircraft. Mr. Bennett fulfilled this responsibility appropriately.

The Lycoming IO-540-K1J5 engine was certificated (FAA Type Certificate 1E4) under the applicable Civil Air Regulations/Federal Aviation Regulations. This included production and dissemination, by Lycoming, of the applicable engine maintenance, overhaul, and operations procedures.

Since the incident aircraft was certificated as an experimental aircraft and the engine was extensively modified taking it beyond its normal certification parameters, Mr. Sedberry certainly would or should have understood the need for specific operation/performance information related to the modified engine. Utilizing an engine for flight without knowing appropriate operating information and limitations is inconsistent with FAR Part 91 *General Operating and Flight Rules*.

Based upon the available materials, no information exists to adequately determine the effect of the extensive modifications on engine maintenance, performance, longevity, and reliability. As such, no expectations should or could be relied upon by Mr. Sedberry pertaining to these parameters. In spite of adherence to FAR Part 43 *Maintenance, Preventive Maintenance, Rebuilding, and Alteration* by Mr. Bennett and compliance with the instructions provided by the engine manufacturer (Lycoming), the engine that Mr.

Sedberry elected to utilize in his aircraft did not meet the standards of safety of FAA certificated engines due to the extensive modifications.

Although no specific provisions existed to measure the extensively modified engine to a condition for safe flight, Mr. Bennett appropriately adhered to the Lycoming manual and related materials for disassembly, inspection, and reassembly. Mr. Bennett's appropriate decision to sign off his work on the incident engine was based upon information contained in FAR Part 43 *Maintenance, Preventive Maintenance, Rebuilding, and Alteration*, the work that he performed, information contained in the Lycoming engine manual and related documents, as well as his years of maintenance experience. An investigation conducted by the FAA subsequent to the engine failure incident, found that Mr. Bennett did *not* violate any Federal Aviation Regulations.

During the engine component inspection at ARAI on July 1, 2009, a smooth impression was noted on the remaining portion of the lock tab surface. This is indicative of substantial torque application to the bolt which further supports Mr. Bennett's proper work processes during the installation of the crankshaft gear assembly. Additionally, the fracture of the lock tab is indicative of appropriate torquing of the bolt. Had the bolt not had significant torque applied to it, the lock tab would have been free to float and, therefore, most likely would not have experienced a fracture failure.

It is obvious that the incident engine was in a safe condition for flight when Mr. Bennett signed it off with respect to the work performed by him. The engine functioned for approximately ten hours, under unknown operating conditions, prior to the engine power loss. It is important to note that once an aircraft or engine leaves a maintenance facility after maintenance, any number of events could occur at any time to render the aircraft or engine unsafe for flight. This is especially true for experimental engine operations. Extensively modified engines such as the incident engine, could fail without warning at any time even if they are operated within parameters of a standard certificated engine and were properly maintained according to available original engine manufacturer instructions. It is noteworthy that Glasair recommends the use of a standard certificated engine in their aircraft for reasons of anticipated performance and expected reliability.

In summary, it is my opinion that:

- Mr. Bennett was properly certificated, experienced, and current as an airframe and powerplant mechanic with inspection authorization to perform the work on the incident engine.
- Mr. Bennett properly performed the disassembly, inspection, and reassembly of the incident engine appropriately utilizing the Lycoming overhaul manual and other associated documents published by the engine manufacturer. Further, Mr. Bennett had his work checked by another mechanic prior to returning the engine to service.
- The incident engine had been extensively modified to significantly increase the horsepower beyond that for which the engine was originally certificated.
- There is physical evidence to indicate that Mr. Bennett did properly torque the crankshaft gear bolt.

The information contained in this report is based on a reasonable degree of certainty with regard to my FAA certifications and experience as an airframe and powerplant mechanic with inspection authorization.

If any additional information becomes available that alters my opinions I will update this report accordingly.

Sincerely,

A handwritten signature in blue ink, appearing to read "Dwight D. Law". The signature is fluid and cursive, with the first name "Dwight" being the most prominent.

Dwight D. Law

ATTACHMENT A

- FAA Aircraft Records of N342MJ
- FAA Accident Package
- N342MJ Aircraft Logbook
- N342MJ Engine Logbook
- N342MJ Propeller Logbook
- Rough Draft of J. Sedberry Deposition Transcript
- Expert Report of M. Stevenson (ESI)
- Documents contained within Bennett Documents DonB 0001 – DonB 0332
 - Maintenance Logbooks
 - Maintenance W/O's
 - FAA Letter from W. Robinson to D. Bennett dated 05-29-2008
 - Notes Indicating Lycoming Modifications – 350 to 375 hp with 10:1 pistons
 - FAA Forms 8130-3 for Engine Components
 - ECI Work Order 72331.1, 72331.2, 72285.1, 72285.2, 72285.3
 - Letter from S. Bereznak (ASI) to P. Powell (Leading Edge Investigations) dated 07-01-2008
 - DB Aerotech Services Invoice # 1449 dated 02-28-2008
 - Photographs of Accident Engine and Components
 - FAA Letter to D. Bennett dated 06-18-2008
 - Lycoming IO-540 Series Parts Listing for Crankshaft
 - Service Bulletin SB-475C
 - ECI Billing Records for Subject Components
 - Glasair Invoice dated 01-07-2008
 - Aerospace Claims Management Group Letter from B. Smith to D. Spruill Esq. dated 08-27-2008
 - Aerospace Claims Management Group Letter from B. Smith to B. Campbell dated 10-22-2008
 - Aerospace Claims Management Group Letter from B. Smith to P. Powell dated 06-27-2008
 - Airworthiness Directive 2004-10-14 C
 - Handwritten Post-Accident Time Table
 - E-mail Communication between P. Powell & D. Bennett 05-04-2008 to 05-06-2008
 - Leading Edge Investigations Letter from P. Powell to D. Bennett dated 09-03-2008
 - Leading Edge Investigations Letter from P. Powell to J. Brewer dated 06-16-2008
 - Inflite Aviation Letter from J. Brewer to P. Powell dated 06-26-2008
 - FAA Registry Inquiry of N342MJ
 - Columbia, SC FAA FSDO Accident Summary
 - Engine Parts List from Triad Engines, Parts & Service Invoices
 - H&H Propeller Service's Documents

- Invoices of Parts for Airframe Repair
- Global Aerospace Letter from B. Campbell to B. Smith 08-28-2008
- Air Service Inc. Repair Estimate for N342MJ
- Global Aerospace's Aircraft Proof of Loss Document
- Turner, Padgett, Graham & Laney P.A. Letter from D. Spruill to D. Bennett 08-15-2008
- American National Property and Casualty Company (ANPAC) Coverage Policy 09-27-2007 to 09-27-2008
- American National Property and Casualty Company (ANPAC) Broad Form Airport Liability Policy
- Lycoming Direct Drive Engine Overhaul Manual
- Applicable Federal Aviation Regulations
- Applicable Advisory Circulars

**DWIGHT DEAN LAW
AEROSAFE, INC.
20 NORTH STREET
DUBLIN, OH 43017
614-889-7491
ddlaw@aerosafegroup.com**

Dwight Dean Law is a Federal Aviation Administration certificated mechanic with airframe and power plant ratings and holds an inspection authorization. In addition, he holds a private pilot certificate and has accumulated approximately 3000 flight hours.

Mr. Law is a recognized consultant and expert in the areas of aviation maintenance and general aviation airport operations. He is experienced in conducting research, analysis, operational reconstruction, and courtroom presentation. Mr. Law has served as a Special Master, appointed by the United States District Court, Northern District of California, to provide consultation and opinion relevant to a class action lawsuit.

In 1989 Mr. Law received a U.S. patent for a safety enhanced battery. The battery is designed for transportation applications, and will eliminate fire and other hazards associated with electrical ignition sources following transportation accidents. Mr. Law has worked with the engineering and experiment station of The Ohio State University to build a prototype of the battery, a project made possible through an award grant from the Thomas Edison Foundation.

Mr. Law managed the Grant County Airport in Petersburg, West Virginia, and established the area's first full service maintenance facility, twin engine charter service, flight school, and fixed-based operation.

Mr. Law also managed Columbus Executive Airport and established Aviation Specialists, Inc. in Columbus, Ohio. Mr. Law, in addition to conducting aircraft maintenance, developed a specialized facility capable of detailed research, development, and testing of aircraft and related components.

Mr. Law began his aviation career with the U.S. Army in 1968. His military training led him to the position of Rotary-Wing Technical Inspector. Mr. Law attended classes at Embry-Riddle Aeronautical University, and was able to secure his Federal Aviation Administration certification prior to his honorable discharge from the Army in 1982.

The New Martinsville, West Virginia native is a past officer of Rotary International, and former member of the West Virginia Airport Managers Association.

Mr. Law resides in West Jefferson, Ohio.

DWIGHT DEAN LAW

20 North Street
Dublin, OH 43017

EDUCATION

- Embry Riddle Aeronautical University, Federal Aviation Administration Airframe & Powerplant Technician Training 1980
 - U.S. Army Officers Candidate School, Fort Benning, Georgia 1978
 - United States Armed Forces Institute, Europe Associate of Arts 1979
 - Glenville State Teachers College 1973
 - U.S. Army Transportation School, Instructor, Airframe Department 1971-1972
 - U.S. Army Aviation 1968-1982
- Attended four aviation-related military occupational skill-producing schools including instruction on ground safety around aircraft, aircraft marshalling, and airport ramp operations
- U.S. Army Non-Commissioned Officers Academy 1969

AERONAUTICAL EXPERIENCE

- Aircraft Maintenance Consultant, Aerosafe, Inc. 2004 - Present
- Manager, Columbus Executive Airport (6I6) 1994 - 2004
- Director of Maintenance, Aviation Specialists Inc., Galloway, OH 1989 - 2004
- President and Operator, Law Aviation, Grant County Airport, Petersburg, WV 1981 - 1988

Established the area's first Federal Aviation Administration approved twin engine FAR Part 135 air taxi and charter operation. Established a Federal Aviation Administration approved in-house, full-service maintenance facility and fixed-base operation. This operation included Advanced Multi-Engine and Airline Transport Pilot Flight Instruction Programs.

FAA CERTIFICATES AND RATINGS

Mechanic certificate with Airframe and Powerplant ratings
Inspection Authorization
Private Pilot certificate with Single-Engine Land rating

AWARDS

- National Aeronautics Association Certificate of Achievement 1989
- F.A.A. Maintenance Technician of the Year 1989
- Industry "Zero Error" Award 1989
- U.S. Army Commendation Medal 1982
- U.S. Army Instructor Training Award 1970

ACTIVITIES

Past President, Potomac Highlands Pilots Association, MD
Former Member, West Virginia Airport Managers Association
Federal Emergency Management Agency Coordinator for Airport Reconstruction
following flood of 1985, Petersburg, WV
Committee Member and Coordinator for Major Improvements at Grant County Airport,
Petersburg, WV
Designed the first V.O.R.-D.M.E. Instrument Approach to Grant County Airport, approved for
publication in 1987, to improve airport capability and enhance safety to General
Aviation
Guest Lecturer, OSU Department of Aviation, The Ohio State University, Columbus, OH
Appointed Special Master by United States District Court, Northern District of California
pursuant to Settlement Agreement
Guest Lecturer, MTSU Department of Aviation, TN

ACHIEVEMENTS

Designed and patented an improved multi-cell battery to eliminate explosions and hazards
associated with ignition source and fire following transportation accidents. Patent No.
4,861,684 issued August 29, 1989.

DWIGHT D. LAW
CONSULTING FEES

For depositions, hearings, and trial testimony an hourly rate of \$295.00 with an 8-hour minimum. Out-of-pocket expenses will be added to the above charges. For all other activities, including but not limited to, research, site inspections, wreckage inspections, etc., an hourly rate of \$210.00 is charged.

DWIGHT D. LAW
TRIAL/DEPOSITION LIST

I have testified as an expert in the following matters within the last four (4) years, to my best recollection:

Mark Godfrey and Nicholas Grace v. Precision Airmotive Corp., et al
Circuit Court, Seventh Judicial Circuit
In and For Volusia County, Florida
Case No. 2001-30640-CICI
Deposition – 10/19/04
Trial – 7/23/07

Leann Littlefield and Jennifer Jewell, Executrices of the Estate of David
and Ann Drye v. Teledyne Industries, Inc. d/b/a Teledyne Continental
Motors, et al
Deposition – 2/9/05

Colgan Air, Inc. v. Raytheon Aircraft Company
U.S. District Court for the Eastern District of Virginia
Alexandria Division
Civil Action No. 1:05cv213
Deposition – 9/13/05

James A. Bishop and Synovus Trust Co., as Co-Executors of the Estates
of R. Mills and M. Mills v. Textron Lycoming, et al
United States District Court
Southern District of Florida
Case No.: 04-60393 CIV-COHN
Deposition – 12/13/05

Yisel Dean and Lisa A. Weiler v. Raytheon Company, Raytheon Aircraft
Holdings, Inc., Raytheon Aircraft Company, and Raytheon Aircraft Credit
Corporation
United States District Court
for the District of Massachusetts
Case No.: 05-CV-10155-PBS and 05-CV-10364-PBS
Deposition – 11/10/06